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A CRITIQUE OF SCOTT'S THEORY OF THE RELATIONSHIP BETWEEN ACKEE SEASONALITY AND ACKEE POISONING

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ABSTRACT. The ackee (*Blighia sapida*) is a beautiful evergreen tree of tropical West Africa that has become Jamaica's most celebrated food plant even though its fruit is more widely known in the scientific literature for its association with poisoning than for its desirability as an edible fruit. The fruit is considered poisonous throughout much of the Caribbean, and its commercial importation into the United States is banned. This is a great loss to Jamaican farmers. Historically, the individual who is most responsible for formulating the idea that ackee poisoning was the cause of an illness called vomiting sickness was Harold Scott, and his work is still being cited in contemporary studies and newspaper articles. The purpose of this paper is to show that Scotts account is inconsistent, especially with regard to his understanding of the relationship between the seasonal availability of ackee and ackee poisoning.

INTRODUCTION

The ackee (*Blighia sapida*) is a beautiful evergreen tree of tropical West Africa that was introduced into Jamaica in the eighteenth century and is now found islandwide from sea level to about 500 m. It has become Jamaica's most celebrated fruit tree even though its fruit -- Jamaica's official national fruit -- is more widely known in the scientific literature for its association with poisoning than for its desirability as an edible fruit (Morton, 1987). Jamaicans consider the fruit poisonous if it is improperly harvested or prepared. According to tradition, the fruit must open on the tree naturally before harvesting and must be thoroughly cleaned before cooking.

As the nineteenth century drew to a close, Jamaica's medical community became increasingly concerned with an illness whose defining symptom was vomiting, and they named it vomiting sickness. Its cause was unknown, its onset sudden, its progress rapid, and its outcome usually deadly. Vomiting sickness was described as prevalent in rural areas in the cool months from November to April, and it was said to occur frequently as a family outbreak that was especially likely to affect malnourished children of African descent. The condition began suddenly with vomiting, followed by weakness, prostration, and a period of apparent improvement. Then came another bout of vomiting, followed by convulsions, coma, and, in many cases, death. Initially, vomiting sickness was attributed to many causes. In the early twentieth century, however, Harold Scott, then the "government bacteriologist" and the "pathologist to the public general hospital" in Kingston, claimed to have established beyond doubt that ackee poisoning was the cause of vomiting sickness (Scott, 1916). A key component of Scott's theory was his firm belief that seasonal availability of ackee was correlated with the annual recurrence of vomiting sickness. I shall argue in this paper that Scott failed in his effort to correlate ackee season with vomiting sickness, and that this failure, along with other inconsistencies, is cause

enough to completely reject his thesis.

In his 1916 and 1917 articles, Scott listed, and then discussed, the nine characteristics he associated with vomiting sickness. These were:

1. Peculiar seasonal prevalence.
2. Its confinement to Jamaica so far as is known.
3. Sudden onset of symptoms in apparent good health, and in the well-nourished as in the emaciated.
4. The rapid and complete recovery of non-fatal cases.
5. Affection of several members in one house or close neighbours in a settlement.
6. Its vastly greater preponderance in children
7. No preference as regards sex.
8. White children practically never attacked, East Indians rarely.
9. The pathological changes set up.

He concluded his 1917 article by noting that all nine characteristics were explainable as "acute intoxication by the unwholesome ackees–the fruit of *Blighia sapida*."

It is not surprising that the "peculiar seasonal prevalence" of vomiting sickness should be at the top of Scott's list since this was intended to be one of the most persuasive aspect of his whole perspective. "The disease," he wrote, "corresponds exactly with the main ackee season, when other fruits and natural foods are relatively scarce . . . This correspondence between the ackee season and vomiting sickness cases is borne out by my records for three or four years past" (Scott, 1916). He stated the same position in even more emphatic terms in a talk published in 1917: "The epidemic character of the disease corresponds exactly with the main ackee season, when other fruits and natural foods are relatively scarce." According to Scott, the ackee was in season during the "cool months" from "November-December to March-April." The problem with this view, however, is that it cannot be systematically correlated with the known seasonality of the ackee.

Based on published accounts, interviews, and field research, it is clear that ackee is available year-round in Jamaica with annual peaks in the winter and summer dry seasons. When we consider these two peaks, we find that, contrary to Scott's views (1916), the main ackee harvest is not in the winter, but in the summer, and this is the most common position presented in published accounts, especially in relationship to the island's canning industry. If this is in fact the true seasonality of the ackee, then why would ackee poisoning be associated with a major annual outbreak of vomiting sickness from the end of autumn through the winter, and not at any other time of the year. Why did Scott not also observe a peak in vomiting sickness in the summer?

It is clear that Scott's view of the timing of ackee season was self-serving. Having convinced himself that ackee poisoning was the cause of vomiting sickness, he distorted the seasonality of the ackee to make his case more persuasive. This is evident in his 1916 article. Since he was sure that ackees ripened from the latter part of autumn through the early spring (November-April), he wrote: "This year the ackee season has continued longer than in previous years in my experience; instead of ending in March or early in April the fruit has been abundant till well on in May; and, owing to an exceptionally good season of rains at unusual times, some trees are even bearing now

(August)" (Scott, 1916). It is obvious that Scott confuses the winter and summer peak harvests, he is grossly mistaken in believing that the ackee available in August was part of the winter peak harvest continuing through the spring into mid-summer, and he wrongly identified winter as "the main ackee season."[i]

In his 1917 article, Scott seemed more aware that the seasonality of the ackee did not correspond exactly to the annual recurrence of vomiting sickness as he had presented it in his 1916 paper and he modified his views. He did so without calling attention to the difficulties that made this modification necessary: "Ackee," he writes, "are also obtainable in smaller quantities at other times, but other foods are then plentiful and this fruit is less eaten." This minor shift in his perspective does not resolve the contradiction in his effort to correlate ackee season and vomiting sickness. If the main ackee crop of the year is in summer, then there should be a corresponding summer peak in the incidence of vomiting sickness. Scott's attempt to account for this paradox by suggesting that other foods are plentiful in the summer and Jamaican's eat less ackee at that time is unacceptable. The great majority of Jamaicans love ackee and will eat as much as they can get of their national fruit, and although "ackee and saltfish" is without doubt the island's favorite breakfast dish, it is also eaten for lunch and dinner.

Scott was wrong about the seasonal availability of ackee, and this has important consequences for other aspects of his theory. This is especially true of his effort to explain the conditions under which Jamaicans would eat "unwholesome ackees" when they know from folk tradition that the fruit can be poisonous if it is improperly harvested, processed, or prepared. According to tradition, the fruit must open on the tree naturally – it must "smile" or "laugh" – before harvesting. The association between open ackees, smiling, and well being is the most important ackee theme in Jamaican culture, and its expression in general knowledge and in the traditional arts reveals in an essential way what Jamaicans must know to eat ackees safely (Rashford, 1996).

Bowrey (1892) published the earliest account linking vomiting sickness with ackee poisoning, but he argued that it was unwholesome ackees – ackees that were green, rotting, or gathered from a broken or decayed branch – that was the cause. Scott accepted Bowrey's account, and to Bowrey's list of the kinds of unwholesome ackee Scott added the dangers of drinking ackee soup and ackee "pot water" (i.e., the water in which ackees were boiled). Now the important question is this: why would Jamaicans eat unwholesome ackee? Scott's argument is as follows:

> Amongst the better classes the ackees are gathered carefully, one by one, and only those which are properly opened and appear ripe and sound in every way are taken for food. Unopened ackees are not used by such people, nor any which have not opened naturally on the tree or have been gathered from an uninjured branch; those forced open after falling from the tree unopened are dangerous. Among the poorer people, however, less care is taken, and a boy is sent up the tree to shake down the fruit; ripe and opened and unripe unopened fall together; the former is collected and the latter left. In time, some of these may open and be gathered with fresh ripe ackees brought down at the next shaking.

Even if we accept the condescending argument that "the poorer classes" eat unwholesome ackees from November through April because they are careless (an

argument which I do not accept because they have the same folk tradition as the rest of the population), there is still one fundamental problem. If ackees are available year-round with winter and summer peaks, why would Jamaicans eat unwholesome ackees in winter and not in summer, and why in rural areas and not urban areas? These are questions for which Scott offers no satisfactory answers.

Though this paper has focused on the seasonal dimension of Scott's theory, it is already evident that the theory is flawed by factual errors and inconsistencies. I wish I could say that these difficulties in Scott's work were just the limitations of an open, honest enquiry, but I do not believe this is the case. Scott identified vomiting sickness as "one of the most interesting diseases occurring in warm climates," and he clearly sought recognition for solving this great medical mystery of his time. In his presentation to the Society of Tropical Medicine and Hygiene on December 15, 1916, he told his audience:

> At present . . . [vomiting sickness] affects only a small part of our tropical possessions. No record of it is to be found in the majority of books on tropical diseases; in one well-known work there are a few lines, mostly wrong. As regards any definite findings as to the nature and causation of the condition, the affection spoken of hitherto as the Vomiting Sickness of Jamaica must be looked upon as a new disease. I will attempt in the time allotted to me to put you in possession of certain facts, which it has been my good fortune to work out and, in some cases, discover.

Scott's goal was clearly to put the ackee on trial, and this was a trial where he made the indictment, and he also served as prosecutor, judge, and jury. Given Scott's personal ambition and the complete absence of a defense, it is not surprising that the ackee was found guilty as charged. The logical conclusion was obvious to many: ackee trees should be destroyed. This was suggested to Scott by a member of the audience when he presented his paper to the Society of Tropical Medicine and Hygiene in December of 1916 (Scott, 1917). In response to this comment, Scott did not object, but noted only that "it would be practically impossible to cut down all these trees in the island [of Jamaica], as they are so plentiful." He neglected to add that it probably would also have meant "war." Although ackee trees were not destroyed in Jamaica, they were in Trinidad not long after Scott's work was published.

Some researchers who have clung to Scott's formulation have been forced to explain the seasonal paradox at the heart of Scott's theory. One approach represented by the work of Evans and Arnold (1938) claims that ackees are more poisonous in the winter than at other times of the year. "In the colder months (December to March), the fruit contains less fat and is apparently more toxic than at other times." Evans and Arnold argue that the fat content of the fruit varies over the course of its development as well as seasonally. Fruits have less fat in the winter, and unripe fruits and fruits with undeveloped seeds have less fat than fully ripe fruits with well developed seeds. The significance of this is that "the toxicity of the arillus of the ackee varies inversely with the fat (and phytosterol) content" (Evans and Arnold, 1938). What is good about this argument is that it takes the seasonal nature of vomiting sickness into account. The explanation offered, however, that ackee is seasonally toxic, is yet to be substantiated. What Evans and Arnold claim is that it is "apparently" so. There are other reasons to be wary of this thesis. If, for the sake of argument, we accept that Evans and Arnold are

correct in claiming that ackee is seasonally toxic, how then do they explain that most cases of vomiting sickness occur in rural, but not urban areas where ackee trees are also common? Moreover, as Williams (1954) points out, "Why should cold weather produce toxic fruit on one certain day and not before or after, and only on one certain tree, or on the trees belonging to five scattered families out of the 50 families in a certain village?".

Chambers (1953) presents another attempt to explain the seasonal nature of vomiting sickness in relationship to ackee poisoning. He does not claim that ackee is seasonally toxic. He argues instead that the high concentration of fat in the ackee and in the Jamaican diet generally produces vomiting sickness in the winter when it is coupled with protein deficiency, and protein deficiency is as an aspect of the seasonal malnutrition that occurs "between January and April . . . when most fruit and farm products grown in the area [of St. Andrew] are out of season." Based on his study of sixty cases admitted to the Kingston Public Hospital, Chambers reported that his observations "*suggest* [my emphasis] that the syndrome is a result of acute parenchymal liver failure due to a diet grossly deficient in first-class protein." He goes on to note "that the diagnosis of cases at present considered to be suffering from `vomiting sickness' or ackee poisoning should be classified under the general term `acute nutritional (parenchymal) hepatitis".

The third effort to correlate the winter prevalence of vomiting sickness with the harvest seasonality of the ackee is presented by Bressler (1976). His argues that under the stress of seasonal hunger, Jamaicans ignore the wisdom of their folk tradition and eat unripe ackees. The outbreaks of vomiting sickness, we are told, reach "epidemic proportions during the colder months of the year, when food is scarce and the ackees are still unripe." This position is unacceptable for reasons that have already been made clear.

The major problem with all explanations based on a presumed correlation between the seasonality of the ackee harvest and vomiting sickness is that they cannot explain why ackee is available year-round with winter and summer peaks, and yet, as Scott claims, ackee poisoning is prevalent from mid-autumn to the early spring (November-April). Many Jamaicans have never accepted Scott's formulation, however, and they have been some of Scott's most serious critics.

Given the heightened concern with ackee poisoning which resulted from Scott's work, the publicity given to the issue in the press, and the occurrence of a major outbreak in 1951 involving 150 cases and 32 deaths, the Government of Jamaica launched a major campaign to investigate vomiting sickness and its links to ackee poisoning. This effort involved many areas of the University of the West Indies in cooperation with the island's medical establishment, and a coordinating committee with Dr. Cicely Williams as its chair was established with the responsibility of directing the research.

In her report, Williams (1954) noted that it was since Scott's 1916 publication that vomiting sickness became associated with ackee poisoning "in most of the literature," and although she did not develop the point fully, she clearly recognized the seasonal paradox inherent in Scott's formulation. "Ackees are fruiting nearly all the year round," she writes, "and yet epidemics of `vomiting sickness' occur mainly in January and February". "In fact," states Williams, "the seasonal prevalence [of vomiting sickness] is one of the arguments against ackee being the chief cause of the condition". What she did emphasize with regard to the seasonal dimension of vomiting sickness was that mortality was highest in Jamaica in the winter and spring, and that this was similar to other

countries that did not have ackee. She also expressed the view that seasonal illnesses caused by "cold weather" and "food shortage" probably had more to do with vomiting sickness than ackee consumption. Williams (1954) writes:

> It must be stressed that the mere history of eating ackees, even if this were clearly proved for every case of vomiting in the Island, does not of itself prove any toxic factor in the ackee. It proves that the ackee is widely eaten, and little more. There are far too many cases in which the history of having eaten ackee is doubtful or negative to prove that the ackee itself is the prime factor in the majority of cases of toxic vomiting ... The winter ackee crop is generally at its height in January and February–just about the time that the "Vomiting Sickness" is most prevalent. A large proportion of the available food consists of ackees. It is likely therefore that a large proportion of the diets contain ackees whether or not these are the cause of a food disturbance of any sort.

In light of the perspective offered by Williams (1954) and the critique of the seasonal dimension of Scott's theory this paper presents, it is reasonable to conclude that ackee consumption in Jamaica might be only coincidentally related to vomiting sickness.

This raises one additional point that should be considered before concluding this paper. Is vomiting sickness a single condition, or is it a symptom associated with a variety of conditions? It is clear that, over the years, vomiting sickness has been attributed to ackee poisoning as well as a wide variety of other causes. Scott was convinced, however, that it was a single condition. He tells us that there were three positions on vomiting sickness when he began his study of the outbreak that occurred in Montego Bay in February 1915:

> Briefly, the period 1886 to 1915 may be summed up by saying that, during the season in which the disease was usually prevalent, any child that died after vomiting was diagnosed (by some practitioners) as having suffered from vomiting sickness, while other medical men, rightly scorning so indefinite a term, erred in signing up true vomiting sickness cases as having died from gastritis, enteritis, worms, malaria, cerebro-spinal meningitis, yellow fever, and so on; while yet a third group–fortunately a small one– on attending patients with some obscure condition terminating fatally, would sign the certificate by the delightfully safe but paradoxical diagnosis, "vomiting sickness without vomiting," or, if of a classical turn of mind and desirous of impressing the relatives, "vomiting sickness *sine vomitu*". . .
>
> This was the state of things then, a veritable chaos, when, in February, 1915, a severe outbreak occurred on the north side of the island, and eighteen deaths took place in a small district in two days, and I was sent down to investigate the matter on the spot (Scott, 1917).

As we have seen, the net result of Scott's research was that the nine characteristics that define vomiting sickness "all find explanation in the view that the condition is an acute intoxication by the unwholesome ackees–the fruit of *Blighia sapida*."

Scott's first major presentation of his work appeared in the Annals of Tropical Medicine and Parasitology in 1916. In December of the same year, he gave a talk to the Society of Tropical Medicine and Hygiene that was well received, and was later published in the Society's proceedings (Scott, 1917). In the discussion that followed the talk, the chairman, Sir David Bruce, spoke for the audience when he said:

> We must all heartily congratulate Dr. Scott on having brought this investigation to a successful termination. Many other men attempted to solve this problem, but all failed. It may be said that the solution is a simple one, and might have been solved by anyone who could look beyond his nose. But this simplicity is the characteristic of all great inventions and discoveries, and it would seem the power to look beyond their own noses is given to few. Dr. Scott evidently belongs to this small and select band, and we hope that he will have many more opportunities of using his gift for the advancement of knowledge and the increase of prosperity to mankind (Scott, 1917).

The laudatory comments of Sir David Bruce were premature, and the results might have benefitted "mankind" in the abstract, but they have not benefitted Jamaicans. In this paper I have tried to show that the characteristic at the top of Scott's list–"the peculiar seasonal prevalence" of vomiting sickness–is not as unproblematic as Scott seems to have thought, and the absence of a genuine correlation between peak ackee seasons and the prevalence of vomiting sickness cast serious doubt on the overall coherence and validity of his theory. In 1955 the name was dropped from use in the statistical information gathered on health conditions in Jamaica, thought it still occurs in popular accounts (Donaldson, 1997).

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ENDNOTES

[1] Examples of some of the published sources that offer support for the perspective that ackee is available in Jamaica year-round with winter and summer peaks can be found in Anonymous (1957a and 1957b), Jordan and Burrows (1937), Cundall (1927), Morton (1987), Potts (1986),Plimmer and Seaforth (1963), and Williams (1954).

[2] Published sources that support the idea that the ackee fruits most abundantly in the summer include Anonymous (1976), Cundall (1927), Hawkes (1976), Potts (1986), Sidrak and Stair (1992).